


August 17, 1960

CF-60-8-70

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DECONTAMINATION AFTER PLUTONIUM RELEASE  
BUILDING 3019, OAK RIDGE NATIONAL LABORATORY

by

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OAK RIDGE NATIONAL LABORATORY  
Oak Ridge, Tennessee  
Operated by  
UNION CARBIDE CORPORATION  
for the  
U. S. ATOMIC ENERGY COMMISSION

To be presented at the ANS Winter Meeting, San Francisco,  
California, December 12-14, 1960

DECONTAMINATION AFTER PLUTONIUM RELEASE  
BUILDING 3019, OAK RIDGE NATIONAL LABORATORY

by

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SUMMARY

On November 20, 1959, a chemical evaporator exploded in Cell 6 of Building 3019 (Power Reactor Fuel Processing Pilot Plant) at Oak Ridge National Laboratory and gram quantities of plutonium were released from the process equipment. The causes and immediate results of the explosion were described in a previous paper.<sup>1</sup> The purpose of this paper is to describe the extent of the contamination in the pilot plant building after the incident, the decontamination specifications and procedures, and the results of the cleanup. The decontamination of a chemical processing plant grossly contaminated with plutonium is extremely difficult. The cost of adequately contained facilities may be easily justified economically by comparison with the consequences of the uncontrolled release of hazardous materials such as plutonium.

In Figure 1 is shown a sectional elevation of Building 3019 through the evaporator cubicle. The smear counts ranged from  $10^8$  in the cell to 50 disintegrations per minute in the offices. (One body burden of Pu-239 is equivalent to  $10^5$  d/min.) The spread of activity through the building was caused by an overpressure in the cell which forced a plutonium aerosol through access holes in the 5 ft. thick walls and the 4 ft. thick ceiling. It was estimated that approximately 70 mg of plutonium was deposited on interior surfaces of the pilot plant outside the cell.<sup>2</sup>

\*ANS member.

The results of the decontamination program are shown in Table 1.

Table 1. STATUS OF BUILDING 3019 DECONTAMINATION PROGRAM, 8-18-60

Area	Man-Days Expended	Status of Contamination Status, $\mu\text{Ci}/100\text{ cm}^2$				Fixing Agent on		
		Trans- ferable		Non-Trans- ferable		Floor	Walls & Ceiling Coats of Paint	Protective Clothing Required
		Avg.	Max.	Avg.	Max.			
Attic	59	7	330	~300	3000	3 coats of paint	3	Minimum
Offices	73	3	18	-	300	None	None	None
Control Room	202	8	128	~300	3000	Tile	3	None
Pipe Tunnel	180	18	228	~300	3000	None	4	Maximum
Sample Gallery	181	15	304	~300	3000	2" Concrete	4	Minimum
Make-up	212	25	254	~300	3000	6" Concrete	4	Minimum
Penthouse Wall, Floor	1160	20	250	300	3000	2" Concrete	4	Minimum
Penthouse Ceiling		45	500	1100	3000	-	4	

Minimum Protective Clothing - 1 pr. coveralls, shoe covers and gloves.

Maximum Protective Clothing - 2 pr. each-coveralls, shoe covers, gloves and 1 assault mask.

Outside the cells, the greatest contamination was in the penthouse and more than half of the 2067 man days of cleanup were expended there. The most difficult area was the 167 by 30 ft. ceiling. After the unsuccessful use of scrubbing with detergents, scraping, and sanding, the only effective decontamination method found was complete removal of all paint with a chemical paint remover.

Floors were cleaned by removal of the concrete surface and were covered by tile or new concrete and paint. Unpainted metal surfaces (other than stainless steel which responded to strong acid cleaning) were particularly difficult to decontaminate and often required grinding until the surface was brightly polished before cleaning specifications were reached.

Internal decontamination of process equipment in Cell 6 was delayed eight months until building modifications could be made to improve containment. After a thorough flushing of all process equipment, the most difficult external decontamination operation ever carried out at ORNL, the cell cleanup, will begin.

#### REFERENCES

1. L. J. King, "Plutonium Release, Building 3019, Oak Ridge National Laboratory", ORNL-CF-60-8-49, August 15, 1960.
2. L. J. King and W. T. McCarley, "Intercycle Evaporator Explosion, Building 3019, Oak Ridge National Laboratory", ORNL-2989; (in preparation).

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ORNL-LR-000-6

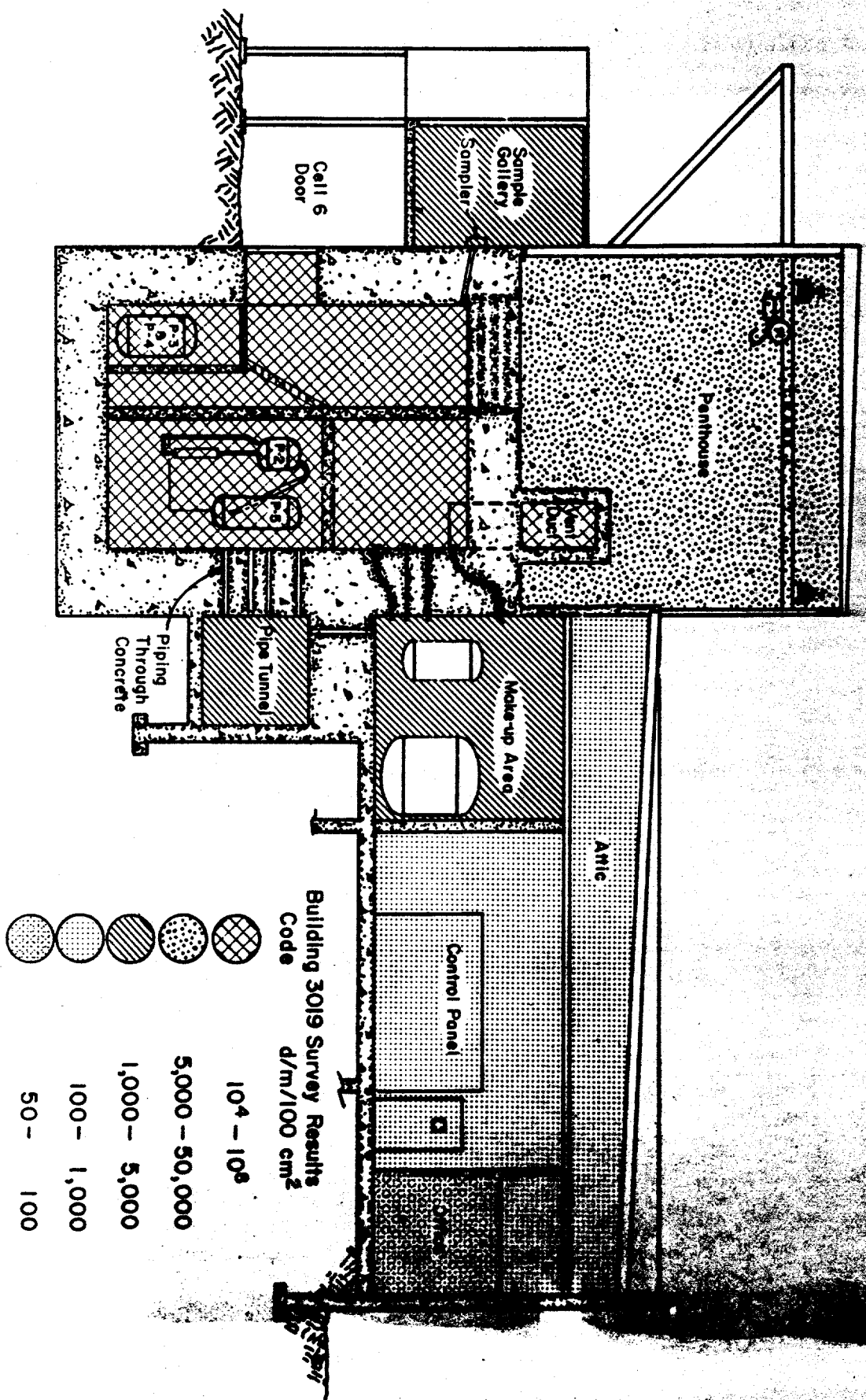


Fig. 1 3019 Bldg. Sectional Elevation Through Cell 6  
Showing Inside Contamination Levels,